

# Course Readings for 'Experiment and Theory in Modern Biology' 2019

This course is designed to introduce first year PhD students to the methods and principles behind current biological research. Students will meet with the faculty organizers once a week to discuss pre-selected papers that illustrate methods of biological deduction. With guidance from the faculty mentors, students will present papers, discuss them, and formulate conclusions regarding the experimental results. By the end of the course, students should be able to critically read a scientific manuscript and to understand principles used in interpreting scientific data. There are no prerequisites for the course.

**When: Tuesdays 9-11 am (Unless otherwise noted)**

**Where: CRC 506 (Unless otherwise noted)**

**Organizer emails:**

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**[Weekly Figure Assignments](#)**

**[Presentation guidelines](#)**

**[Attendance policy](#)**

## **ORGANIZATIONAL MEETING**

**September 03, 2019 (2:30 pm, NOTE DIFFERENT TIME)**

Short mandatory meeting. A discussion of course content, format, and grading.

## **CLASS 1**

**September 10, 2019**

Luria, S., and Delbruck, M. (1943). Mutations of bacteria from virus sensitivity to virus resistance. *Genetics* 28: 491-511. [\[PDF\]](#)

Sturtevant, A. H. (1913). The linear arrangement of six sex-linked factors in *Drosophila*, as shown by their mode of association. *Journal of Experimental Zoology*, 14: 43-59 [\[PDF\]](#)

## **CLASS 2**

**October 01, 2019 (Presentations: Kevin Barber, Patrick Darcy, Alexander Epstein)**

Lee RC, Feinbaum RL, Ambros V. (1993). The *C. elegans* heterochronic gene *lin-4* encodes small RNAs with antisense complementarity to *lin-14*. *Cell* 75:843-54. [\[PDF\]](#)

C. Napoli, C. Lemieux and R. Jorgensen. (1990). Introduction of a chimeric chalcone synthase gene into *petunia* results in reversible co-suppression of homologous gene in trans. *Plant Cell* 2:279-289. [\[PDF\]](#)

## **CLASS 3**

**October 08, 2019 (Presentations: Audrey Goldfarb, Michael Grodus, Mason)**

## **Hargrave)**

Avery, Oswald T., Colin M. MacLeod, and Maclyn McCarty. (1944). Studies on the Chemical Nature of the Substance Inducing Transformation of Pneumococcal Types: Induction of Transformation by a Desoxyribonucleic Acid Fraction Isolated from Pneumococcus Type III. *J. Exp. Med.* 79: 137-158. [\[PDF\]](#)

Hershey, A.D. and Chase, M. (1952). Independent functions of viral protein and nucleic acid in growth of bacteriophage. *J. Gen. Physiol.* 36: 39-56. [\[PDF\]](#)

## **CLASS 4**

**October 22, 2019 (Presentations: Florian Hollunder, Zachary Kerner, Priyanka Lakhiani)**

Meselson, M., and Stahl, F. (1958). The replication of DNA in *E. coli*. *Proc. Natl. Acad. Sci. USA* 14: 671-682. [\[PDF\]](#)

Dintzis, H.M. (1961). Assembly of the peptide chains of hemoglobin. *Proc. Natl. Acad. Sci. USA* 47: 247-261. [\[PDF\]](#)

## **CLASS 5**

**October 29, 2019 (Presentations: Simin Liu, Yuyang Liu, Wenbin Mei)**

Berget, S.M., Moore, C., and Sharp, P.A. (1977). Spliced segments at the 5-prime terminus of adenovirus 2 late mRNA. *Proc. Natl. Acad. Sci.* 74: 3171-3175. [\[PDF\]](#)

Kane, P. M., Yamashiro, C. T., Wolczyk, D. F., Neff, N., Goebel, M., and Stevens, T. H. (1990) Protein splicing converts the yeast TFP1 gene product to the 69-kD subunit of the vacuolar H<sup>+</sup>-adenosine triphosphatase. *Science* 250: 651-657. [\[PDF\]](#)

## **CLASS 6**

**November 05, 2019 (Presentations: Karl Palmquist, Gabrielle Paniccia, Rafal Piwowarczyk)**

The Huntington's Disease Collaborative Research Group. (1993). A Novel Gene Containing a Trinucleotide Repeat That Is Expanded and Unstable on Huntington's Disease Chromosomes. *Cell*, 72: 971-983. [\[PDF\]](#)

Allison, AC. (1954) PROTECTION AFFORDED BY SICKLE-CELL TRAIT AGAINST SUBTERTIAN MALARIAL INFECTION. *Br. Med. J.* 1(4857): 290-294. [\[PDF\]](#)

## **CLASS 7**

**November 12, 2019 (Presentations: Katherine Rosas Villegas, Marwa Saad, Sairaj Sajjath)**

Jamieson, J.D. and Palade, G.E. (1967). Intracellular transport of secretory proteins in the pancreatic exocrine cell. II. Transport to Condensing Vacuoles and Zymogen Granules. *J. Cell Biol.* 34: 597-615. [\[PDF\]](#)

Balch, W.E., Dunphy, W.G., Braell, W.A., and Rothman, J.E. (1984). Reconstitution of the Transport of Protein between Successive Compartments of the Golgi Measured by the Coupled Incorporation of N-Acetylglucosamine. *Cell* 39: 405-416. [\[PDF\]](#)

## **CLASS 8**

**November 19, 2019 (Presentations: Peter Schade, Marina Scherthanner, Rani Shiao)**

Fatt P and Katz B. (1952). Spontaneous subthreshold activity at motor nerve endings. J Physiol. 117:109-128. [\[PDF\]](#)

Hubel, DH and Wiesel, TN. (1959). Receptive fields of single neurones in the cat's striate cortex. J. Physiol. 148: 574-591. [\[PDF\]](#)

**CLASS 9**

**December 03, 2019 (Presentations: Rochelle Shih, Yael Tsitohay)**

Steinman, R. M. and Witmer, M.D. (1978). Lymphoid dendritic cells are potent stimulators of the primary mixed leukocyte reaction in mice. Proc. Natl. Acad. Sci. 75: 5132-5136. [\[PDF\]](#)

Sakaguchi, S., Takahashi, T., and Nishizuka, Y. (1982). Study on cellular events in post-thymectomy autoimmune oophoritis in mice. J. Exp. Med. 156: 1577-1586. [\[PDF\]](#)

**CLASS 10**

**December 10, 2019 (Presentations: Elena Waidmann, Georg Johannes Weymar)**

Stehelin, D, Varmus, HE, Bishop, JM, and Vogt, PK. (1976). DNA related to the transforming gene(s) of avian sarcoma viruses is present in normal avian DNA. Nature 260: 170-173. [\[PDF\]](#)

Eliyahu, D, Raz, A, Gruss, P, Givol, D, Oren, M. (1984). Participation of p53 cellular tumour antigen in transformation of normal embryonic cells. Nature 312: 646-649. [\[PDF\]](#)

**CLASS 11**

**December 17, 2019 (Presentations: Joanna Yeung, Mengyin Zhang)**

Yildiz, A., Tomishige, M., Vale, R.D., and Selvin, P.R. (2004). Kinesin walks hand-over-hand. Science 303: 676-8. [\[PDF\]](#)

Noji, H., Yasuda, R., Yoshida, M., and Kinoshita Jr., K. (1997). Direct observation of the rotation of F1-ATPase. Nature 386: 299-302. [\[PDF\]](#)

## Presentation Guidelines

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Each presentation should build on a problem or concept raised in the previous week's reading. The goals are:

- (1) to come up with a question stemming from the reading.
- (2) to explain why this is an interesting question.
- (3) to design an experiment to study the question.
- (4) to assess the merits and pitfalls of the experimental strategy proposed.

The presentation should not exceed 3 minutes, and will be followed by a short general

discussion of the group. While the question raised can be only tangentially related to the reading, it should be well defined and amenable to study.

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## Attendance policy

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Students are expected to attend **all classes** and cannot miss more than one class to pass the course. Students missing a class should write a one-page summary of the papers they missed. Describe the question, methods, and results, and provide a critique and possible followup studies.